

# Assay

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## Description

The Assay File provides references to assay results including measurements, images, raw data files, derived data files, and other file types. There can be multiple Assay Files per study.

## File Format

The ISA-TAB-Nano Assay File leverages the ISA-TAB file format, which is a horizontal-based spreadsheet format with column headers and row values. An example subset of this format is provided in TABLE 1. Please note, concepts specified within the bracket “[ ]” are variables depending on the type of assay.

TABLE 1: Example Subset of the Assay File Format

A	B	C	E
Sample Name	Assay Name	Measurement Value[z-average(hydrodynamic diameter)]	Unit
NCL-20-1	size by DLS assay	5.2	nm
NCL-20-2	size by DLS assay	8.6	nm

## Fields

According to the ISA-TAB specification, the Assay File has different types of fields called nodes, attributes of nodes, qualifiers of nodes' attributes, and other valid fields. In support of ISA-TAB-Nano, extensions were applied to the Assay File to record the endpoint value of an assay measurement (Measurement Value).

The Assay File supports the following types of information:

- Sample name
- Assay protocol reference, protocol parameter values, performer, and date the protocol was performed
- Assay name
- Assay factor values including units, if applicable
- Assay measurement values including units and qualified by statistics, if applicable
- Image files, raw data files, derived data files or other files, if applicable

## Nodes

*Sample Name*--- The unique identification name of the sample, which is referred to from within the study file. The sample is obtained after the application of a protocol. Sample names can be qualified only using *Comment*.

*Image File*---The name or URI of an image file generated from an assay.

*Raw Data File*---The name or URI of the raw data files.

*Derived Data File*---The name or URI of the file resulting from data transformation or processing.

Attributes of assay nodes---One or more attributes are used to provide more information about a assay node. The different assay node attributes are described below:

*Material Type*---An attribute for the *sample name* (for example, biospecimen, nanoparticle sample, small molecule etc.) if the same attribute is not given in the Study file. The term can be a free-text description or taken from an ontology or a controlled vocabulary. If it is the latter, then the following qualifiers are used: *term accession number* and *term source REF*.

*Characteristics [ ]*---An attribute for *sample name* if the same attribute is not given in the study file.

*Assay Name*---The name of the assay performed. This name is used as an identifier within the assay file.

## Attributes of Processing Events for Assay Nodes

One or more attributes are used to describe a step in the assay of a sample.

*Protocol REF*--- The name of the protocol used to perform the experiment. This name should be obtained from a value for the field *study protocol name* in the investigation file.

*Performer*---The name of the person who carried out the protocol.

*Date*---The calendar day on which the protocol was carried out. The date format should be in YYYY-MM-DD.

*Parameter Value [ ]*--- Value of a parameter, which is kept constant, when applying a protocol. The parameter term is written within brackets and must match the term used as value for the *study protocol parameter name* in the investigation file.

*Measurement Value [statistic(measurement name)]*---The endpoint of the assay. Measurement value names are described in brackets or parenthesis if a statistics (e.g., mean, standard deviation) is applied to the measurement (Syntax: Measurement Value[statistic(<measurement name>)]). A statistic is only required for statistical measures.

## Qualifiers for Assay Nodes' Attributes

Each node attribute may be qualified using the following concepts, if applicable.

*Unit*---The standard of measurement used if the values for *characteristic [ ]*, *parameter value [ ]*, *factor value [ ]*, or *measurement value [ ]* columns are quantitative and dimensional. If the term for *unit* is taken from an ontology/controlled vocabulary, then its *term accession number* and the *term source REF* should be defined in the ISA-TAB-Nano Assay File.

*Term Accession Number*---Identification number of a term selected from an ontology or a controlled vocabulary, if the term is entered as a value in *material type*, *characteristics [ ]*, *parameter value [ ]*, *measurement value [ ]*, *unit* or *factor value [ ]* columns.

*Term Source REF*---The name which identifies the source from where a term is selected and entered in ISA-TAB-Nano study files. This name should match one of the names entered in the *term source name* field in the ISA-TAB-Nano Investigation File.

## Other Assay Fields

*Factor Value [ ]*---The value of an independent variable manipulated by the experimentalist with the intention to affect the subject of study (that is, stressor). Factor terms are given in brackets, and must be defined in the ISA-TAB-Nano investigation file in the STUDY FACTORS section. Factor Value [ ] in the Assay file should reference technical variations (such as software, instrument or protocol variations).

*Comment [ ]*---Any comment that provides additional information, which is added only when no other appropriate field exists.

## Files

The Assay File Examples, Template, and Glossary are provided below.

- [Assay File Examples](#)
- [Assay File Template](#)
- [Assay File Glossary](#)